

Pending Claims

The following Listing of Claims replaces all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (original): An integrated circuit system, comprising:
a die incorporating an integrated circuit and having a top side and a bottom side, the top side supporting an electrical signal communication metallization and a top side thermal dissipation metallization, and the bottom side supporting a bottom side thermal dissipation metallization.

Claim 2 (previously presented): The system of claim 1, wherein the electrical signal communication metallization comprises a plurality of exposed bonding elements on the top side of the die.

Claim 3 (previously presented): The system of claim 2, wherein the bonding elements are contained in a peripheral region on the top side of the die.

Claim 4 (previously presented): The system of claim 3, wherein the top side thermal dissipation metallization is contained in a central region on the top side of the die.

Claim 5 (previously presented): The system of claim 4, wherein the top side thermal dissipation metallization is surrounded by the plurality of bonding elements.

Claim 6 (previously presented): The system of claim 1, wherein the electrical signal communication metallization surrounds the top side thermal dissipation metallization.

Claim 7 (original): The system of claim 1, wherein the top side thermal dissipation metallization comprises a patterned metal layer.

Claim 8 (original): The system of claim 7, wherein the patterned metal layer comprises at least one through-hole.

Claim 9 (original): The system of claim 8, wherein the patterned metal layer comprises an array of through-holes.

Claim 10 (original): The system of claim 1, further comprising a package comprising a top heat spreader metallurgically bonded to the top side thermal dissipation metallization of the die.

Claim 11 (original): The system of claim 10, wherein the integrated circuit is connected electrically to the top side heat spreader by an electrical path extending through the top side thermal dissipation metallization.

Claim 12 (original): The system of claim 10, wherein the package further comprises an electrical interface and a substrate containing a wiring interconnection between the electrical signal communication metallization and the electrical interface.

Claim 13 (original): The system of claim 12, wherein the top heat spreader is mounted on the substrate and forms a lid of the package covering the top side of the die.

Claim 14 (original): The system of claim 10, wherein the package further comprises a bottom heat spreader metallurgically bonded to the bottom side thermal dissipation metallization of the die.

Claim 15 (previously presented): A method of making an integrated circuit system, comprising:

forming on a top side of a substrate multiple die regions each having a top side supporting an exposed electrical signal communication metallization and an exposed top side thermal dissipation metallization;

forming on a bottom side of the substrate an exposed bottom side thermal dissipation metallization for each die region; and

singulating the die regions to form respective integrated circuit dice.

Claim 16 (previously presented): The method of claim 15, wherein, in each die region, the electrical signal communication metallization surrounds the top side thermal dissipation metallization.

Claim 17 (previously presented): The method of claim 15, wherein each top side thermal dissipation metallization comprises an exposed metal layer with an array of through-holes.

Claim 18 (original): The method of claim 15, further comprising mounting each singulated die in a respective package having a top heat spreader, wherein mounting a singulated die comprises metallurgically bonding the top heat spreader of a package to the top side thermal dissipation metallization of the singulated die.

Claim 19 (original): The method of claim 18, wherein the package additionally includes a substrate and mounting the singulated die further comprises mounting the package substrate to the bottom side thermal dissipation metallization of the singulated die.

Claim 20 (original): The method of claim 18, wherein the top heat spreader is mounted on the substrate and forms a lid of the package, and further comprising encapsulating the die within the package with an encapsulating material.

Claim 21 (previously presented): The system of claim 1, wherein the electrical signal communication metallization is free of any direct electrical connection to the top side thermal dissipation metallization on the top side of the die.